DOUBLE WHAMMY THE GREAT SWITCH AND A COMPLEX ENDGAME

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ABSTRACT

In 1988 the world health assembly resolved to eradicate poliomyelitis.The Live attenuated oral polio vaccine was the captain against the fight to eradicate poliomyelitis.It had indeed many advantages in the fight to eradicate polio.But despite its many advantages it has a risk for occurrence of rare cases of paralytic poliomyelitis among immunologically normal OPV recipients and additional risk of emergence of Vaccine derived polio virus(VDPVs).Poliovirus being an RNA virus are notorious for mutation.India is a polio free country since 2011 however endemicity of its neighbours are a detterent against dropping guard.This article reviews the introduction of Bivalent oral polio vaccine instead of trivalent oral polio vaccine and rationale of addition of Inactivated Polio vaccine on the road to the—Endgame Strategy.

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INTRODUCTION

Global Polio Eradication initiative has been advocating *Polio Eradication and Endgame Strategic Plan 2013-2018* (1).Now the most interesting thing about this plan was that it had a blueprint a very specific timeline for the eradication of polio virus and it also included the eradication of paralytic polio cases caused by oral polio vaccine, a significant first from its other counterparts. It had suggested a logical synchronized withdrawal of oral polio vaccine from this WHO region. Given the importance that this is a top Global priority the countries of this WHO region are expected to fall in line with this plan.So the basic strategy is to address both wild and vaccine derived polio virus simultaneously. The plan anticipates and prepares for potential challenges and enables rapid responses to obstacles and to avoid delays.

WHY OPV WITHDRAWAL?

The Live,attenuated oral polio virus vaccine(OPV) has many advantages favoring its use in polio eradication.It is administered easily by mouth,conferes intestinal immunity making recent OPV recepients resistant to infection by **Wild Polio Virus.** It provides long term protection against paralytic diseases through humoral immunity and its inexpensive (2).But despite this advantages it also carries a risk of occurrence of rare cases of vaccine associated paralytic poliomyelitis and emergence of risk of vaccine derived polioviruses (VDPV). This occurs because poliovirus is an RNA virus and RNA virus are notorious for mutations. The genetic instability of the sabin virus seems to be the main cause of VAPP,a disease that is more frequently associated with Type 3 and Type 2 sabin strains. Killed vaccine on the other hand is thought to protect the individuals and will not have the problem of VAPP. Now because of these risks it seems prudent to discontinue OPV use worldwide once the goal of eradicating all wild polio virus is achieved.So the advantages of using Oral Polio vaccine starts declining as the disease seems to be eradicating from a region because of a realistic risk of vaccine associated paralytic poliovirus and vaccine derived polioviruses. The most logical next step would be to sequentially phase out the use of Oral polio vaccine from a region in a synchronized way.

VACCINE ASSOCIATED PARALYTIC POLIOMYELITIS (VAPP) VS VACCINE DERIVED POLIO VIRUS(VDPV)

VAPP are a sort of adverse reaction to OPV administration. The virus seems to revert back to neurovirulence .However this virus itself may not transmit to other children in the community. The incidence of VAPP has been estimated to be at (2-4) cases/million birth cohort per year in countries using OPV[3]. VAPP occurs both in vaccine recipients and their unimmunized contacts. All three viruses in tOPV are responsible for cases of VAPP, but Sabin Virus 2 causes 40% of cases(40).

However the vaccine derived Polio virus(VDPV) are riskier than the vaccine associated Paralytic Poliovirus(VAPP) as these genetically reverted vaccine derived poliovirus can silently spread and cause polio in children who are not sufficiently vaccinated. In general the live attenuated virus in vaccines are supposed to be highly stable and non transmissible however OPV breaks both these rules.

In developed countries VAPP seems to occur early in infancy and usually associated with early infancy howver in developing countries VAPP seems to occur later and associated with subsequent doses of polio vaccine. The main factors responsible for this difference are considered to be lower immune responsiveness to OPV and higher prevalence of maternally-derived antibodies in populations in developing countries. (5)

VDPV are further classified into 1.cVDPV's (Circulating)2.i VDPV's(Immunodeficiency associated)3. aVDPVs(ambiguous). The behaviour of cVDPVs can be similar to that of WPVs, with significant paralytic attack rates and sustained person to person transmission. Recent experience indicates that low vaccination coverage is a major risk factor for cVDPV outbreaks; cVDPVs have the ability to become endemic and can be imported & spread in an undervaccinated community.(6-7)

Low vaccination coverage also predisposes to cVDPV and it can become endemic in any geographical location where the vaccination coverage is eratic and below par.Cases of VDPV's can occur with Type 1 and Type 3 however most of the outbreaks are due to Type 2.There has to be a balance between high herd immunity due to adequate coverage of Oral polio vaccine that would furher protect imporations from the neighbouring countries and the gradual introduction of Inactivated polio vaccine that would eventually help in to quell the cases of cVDPV and VAPP. This is the most logical step towards a polio free world. True polio eradication is the zero incidence of polio virus infection by both wild and vaccine virus infection.

THE GREAT SWITCH

Although maximum cases of paralytic polio were caused by WPV 1, it was OPV 2 that proved most *notorious* in the vaccine. Firstly, because of its higher immunogenicity, it prevented development of effective immunity against WPV 1 and 3 among those vaccinated with tOPV(8). Secondly, recent estimates have found that approximately 90% of cVDPV cases and 40% of VAPP cases were associated with the type 2 component of tOPV(9). Moreover, no case of paralytic polio due to WPV 2 has been detected since 1999.Therefore it seems epidemiologically reasonable to include bOPV that would offer better protection against wild poliovirus 1 and wild poliovirus 3.The research study in 2008 had indicated that with two doses of bOPV the seroconversion was high against both wildpolio virus 1 and wild poliovirus 3. (10)The switch most occur globally in a coordinated manner so that risk of reemergence of VDPVs due to type 2 is prevented.In India the bOPV components are to be introduced all over from April 25th 2016.

IPV ENTRY AT 14 WEEKS AND WHY ONLY ONE DOSE??

It has been seen widely that IPV before OPV offers protection so the most logical step would be an IPV before any dose of OPV is given.However experimental studies in India has shown that in countries where there is a too much dependence on OPV to control poliomyelitis maternally acquired antibodies interfers in effectiveness of IPV in early infancy.(11)

The principal reason of adding one dose of IPV to the schedule is to prevent cases of paralytic polio due to Type 2 virus when the switch is made from tOPV to bOPV that does not include OPV2. In addition to this primary aim, IPV will boost the immunity against Type 1 and 3, thus facilitating faster march towards eradication, and it will also decrease VAPP and cVDPV cases due to all three viruses.(11)

CONCLUSION

The introduction of the great switch from Trivalent OPV vaccine to Bivalent OPV vaccine and the foray of the Inactivated Polio vaccine seems to be a very logical step in the fight to eradicate polio from this subcontinent. Renewed efforts from all governments of this region is required to eliminate this menance and the presence of

conflict zone would certainly make this realization difficult. Polio eradication now seems both tantalisingly close and elusively distant it is now becoming increasingly harder to maintain funding and there is a danger that the fruits of two decades of fight may be lost if guard is now let down. There seems to be many unanswered questions on the circulation of contaminated oral polio vaccine increasing incidences of respiratory synctial virus infection all over the Globe. Do we well know this diseases or there are couple of surprises still in store for us only time will tell.

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